

DEPARTMENT OF COMMERCE

UNITED STATES BUREAU OF MINES
SCOTT TURNER, DIRECTOR

REPORT OF INVESTIGATIONS

MOTOR GASOLINE SURVEY, AUGUST, 1931

PART I - SPECIFICATION DATA



BY

U.S. DEPOSITORY

A. J. KRAEMER AND E. C. LANE

R. I. 3162
February, 1932

REPORT OF INVESTIGATIONS
DEPARTMENT OF COMMERCE - BUREAU OF MINES

MOTOR GASOLINE SURVEY, AUGUST, 1931¹

PART I - SPECIFICATION DATA

By A. J. Kramer² and E. C. Lane³

INTRODUCTION

The twenty-fourth of a series of semiannual surveys pertaining to motor gasoline marketed in the United States was made by the Bureau of Mines in August, 1931. The first part of a report giving the results of that survey as they pertain to specification data is given in this paper. A companion report, Part II, is in preparation and will discuss the results of other determinations made on the samples, including octane number ratings on the individual samples (to be made by the Bureau of Standards) and results of the determination of gravity, color, doctor test, and "gum" content by the copper dish method and the Bureau of Mines steam-oven method. The retail price and the tax at the time each sample was taken will also be reported.

History of Survey

The Bureau of Mines made its first survey of motor gasolines sold throughout the United States in 1915,⁴ a second in 1917,⁵ and a third in April, 1919.⁵ These three surveys showed that during each 2-year interval the motor gasoline had become notably less volatile. In order

-
- 1 The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Report of Investigations 3162.
 - 2 Senior refinery engineer, U. S. Bureau of Mines.
 - 3 Assistant petroleum chemist, U. S. Bureau of Mines.
 - 4 Rittman, W. F., Jacobs, W. A., and Dean, E. W., Physical and Chemical Properties of Gasoline Sold Throughout the United States During the Calendar Year 1915: Tech. Paper 163, Bureau of Mines, 1916, 45 pp. (out of print; consult libraries).
 - 5 Hill, H. H., and Dean, E. W., Quality of Gasoline Marketed in the United States: Bull. 191, Bureau of Mines, 1921, 275 pp. (out of print; consult libraries).

to ascertain whether the change in volatility was continuing, a series of semiannual surveys was instituted. The first of this semiannual series was made in January, 1920.⁶ These semiannual surveys have been continued without interruption since that time.

During the period covered by these surveys a great deal of study and experimental investigation has been carried on by various research groups and individuals throughout the industry to determine the essential properties of motor fuels in terms of performance in engines operating on the explosive cycle.

Knowledge of these requisites of performance is now much more general than was any technical knowledge of gasoline in 1915. This increased technical knowledge has been applied practically in manufacturing processes and has aided in bringing about a degree of uniformity of motor fuel properties. The American motorist is now afforded a plentiful supply of a relatively low-priced fuel, available even in the most remote sections of the country, and motor fuel which is probably better suited to the requirements of the automobile engine than any fuels that were generally available when the earlier gasoline surveys of the Bureau of Mines were made.

The twenty-first semiannual survey gave evidence that a more complicated motor-gasoline situation had been developing within the United States. A larger variety of motor fuels and a wider range of retail prices were encountered by Bureau of Mines engineers in collecting the samples. An increased emphasis on premium quality was noted also. To make the twenty-second semiannual survey more comprehensive than those that had preceded it, the Bureau of Mines decided to test the supposition that local conditions in those sections of the United States not reached directly by the past several surveys were different from the conditions indicated by the samples that had been collected. Therefore, samples were taken in 19 areas instead of 12 as had been done in several previous surveys, and the number of samples was doubled; approximately 300 samples were taken as compared with approximately 150 in the past. For comparison, the samples were divided into "competitive-price gasoline" and "premium-price motor fuels." Some investigators had felt that the practice followed in previous semiannual surveys of grouping all types of motor fuel together without differentiating between "competitive-price gasoline," benzol blends, Ethyl gasoline, "high-test" gasoline, and other "premium" fuels had detracted from the usefulness of the survey reports. They felt that the data did not permit drawing conclusions in regard to any one type of fuel and tended to obscure differences between fuels of the various types.

6 Smith, N. A. C., The Motor-Gasoline Surveys of 1920 and 1921: Tech. Paper 328, Bureau of Mines, 1923, 41 pp.

The Bureau of Mines tentatively has decided to omit, for the present at least, its customary survey of winter motor fuels, but it is planning to continue as an annual survey its collection, analysis, and study of summer motor fuels, made in August of each year. This plan has been made necessary because of the greatly increased cost of the more comprehensive surveys initiated in August, 1930, and the lack of funds to carry on these more extensive surveys semiannually.

Data Presented in Twenty-Fourth Survey

This paper deals with the data of the twenty-fourth survey in accordance with the new specification for United States Government Motor Gasoline, which was approved for promulgation by the Federal Specifications Board on July 21, 1931, and which will become mandatory in all departments and independent establishments of the Government after March 1, 1932.⁷

The samples in this survey have been classified as "competitive-price gasolines" and "premium-price motor fuels," a method of presentation that was begun with the twenty-second semiannual survey and has been followed since that time.⁸ A total of 319 samples was collected for the present survey from service station pumps in 19 areas throughout the United States. Of this number of samples, 221 were "competitive-price gasolines" and 98 were "premium-price motor fuels."

"Competitive-price gasoline" includes those fuels that are sold at the generally recognized local base price and all fuels that are sold below that price. All fuels that are sold at an advance over the generally recognized base price are placed in the class of "premium-price motor fuels." These fuels include Ethyl gasolines, benzol blends, "high-test" fuels, and those fuels that owe their "antiknock" rating to the process of manufacture rather than to the addition of other material such as Ethyl fluid or benzol. The term "high-test" is generally applied to motor fuels that are more volatile than the regular competitive-price gasolines. "High-test" fuels also may have (but not necessarily) a high antiknock rating.

Collecting Samples

All of the samples of this survey were collected during August, 1931. As in the past, the samples were obtained directly from the hose at the gasoline pump at the service station. The use of a funnel in transferring the gasoline from the hose to the sample can was avoided whenever possible. The samples were collected by chemists or engineers of the bureau who were familiar with the requirements for sampling.

7 Copies of the specification can be obtained, at a cost of five cents, from the Superintendent of Documents, Government Printing Office, Washington, D. C. (Not included in Bureau of Mines Tech. Paper 3233.)

8 Lane, E. C., Garton, E. L., and Kraemer, A. J., Twenty-Second Semi-annual Motor-Gasoline Survey: Rept. of Investigations 3063, Bureau of Mines, December, 1930, 19 pp.

One-gallon screw-capped tin cans were used. After a can had been filled to within 1 inch of the top, the cap (which was provided with a composition gasket covered with tin foil) was screwed on and tightened by means of pliers. The use of a soldering iron to seal the tops was not considered advisable. Samples from Denver, El Paso, Salt Lake City, Seattle, Los Angeles, and San Francisco were packed, four to a stout wooden box, and shipped by freight to the Petroleum Experiment Station of the United States Bureau of Mines at Bartlesville, Okla., where the samples were analyzed. The samples from the other cities in the survey were collected by O. C. Elade, junior chemist of the bureau. As the samples in each city were collected, they were packed, four to a box, and shipped to Bartlesville by freight. Upon being received at the Petroleum Experiment Station, the samples were stored in a cool place until needed for analysis.

ACKNOWLEDGMENTS

The distillation range determinations given in this paper were made by E. L. Garton, junior chemical engineer; Reid vapor-pressure measurements by Ralph Hockenson, junior engineer; sulphur determinations by Ralph Hockenson and Russell Thurn, junior chemist; and corrosion tests by Conrad Suman, laboratory aide - all of the United States Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla.

DATA AND RESULTS

Tables

Table 1 gives a comparison of the sulphur content of the samples collected in the past three surveys, on the basis of the percentage of each survey which had 0.06 per cent of sulphur or less, 0.08 per cent of sulphur or less, and 0.10 per cent of sulphur or less.

Table 2 gives a similar comparison of Reid vapor pressures on the samples of these three surveys, on the basis of the percentage of samples of each survey which had Reid vapor pressures of 8.0 pounds or less, 8.1 pounds to 10.0 pounds, and more than 10.0 pounds per square inch.

Table 3 gives the results of all determinations reported in this paper that were made on the 319 individual samples of this survey, Tables 4, 5, and 6 give the classification according to results of the sulphur determination for all samples, competitive-price gasolines, and premium-price motor fuels, respectively. Tables 7, 8, and 9 give the classification according to results of the Reid vapor pressure test for all samples, competitive-price gasolines, and premium-price motor fuels, respectively.

Corrosion Test

The apparatus and procedure for making the corrosion test are described in Method D 130-27 of the American Society for Testing Materials,

which is given in Bureau of Mines Technical Paper 323B,⁹ and in publications of the American Society for Testing Materials, Philadelphia, Pa. Only two of the 319 samples in this survey failed to pass this test, which indicates that little fear of corrosion need be felt with these gasolines at atmospheric temperatures. According to Rue and Espach,¹⁰ the copper-strip corrosion test depends on time and temperature, and some gasolines which are negative to the corrosion test when made for three hours at 122°F. are positive when the test is made for two hours at 200°F.

Distillation Range

The apparatus and procedure for making the distillation test are described in Method D 86-30 of the American Society for Testing Materials.¹¹

Five samples, or 2.3 per cent of the competitive-price gasolines, failed to pass one or more of the distillation requirements of the Federal specification for United States Government Motor Gasoline. No premium-price motor fuels failed in this respect. Two of the five samples were so-called "third" grade gasolines¹² of major marketers.

The new Federal specification for United States Government Motor Gasoline requires that, unless otherwise specified, all tests shall be made as of the point of delivery in accordance with the methods for testing contained in Part 2 of Technical Paper 323B. In accordance with this provision, the distillation tests for samples collected in El Paso should have been made as of a barometric pressure of 365 millimeters of mercury, which is the mean average barometric pressure recorded by the United States Weather Bureau for El Paso during the month of August. This circumstance was not taken into account in making the distillation tests on the El Paso samples (see Table 3, p.15) and four samples from that city are indicated as not passing the distillation requirements of the new Federal specification. The barometric pressure at Bartlesville at the time that the El Paso samples were distilled was 739 millimeters of mercury. A table is given in American Society for Testing Materials method D 86-30 showing corrections due to difference in barometric pressure. Calculations based on that table show that the percentages given in Table 3, page 15 of this report for samples collected in El Paso would have been evaporated when the mercury of the distillation thermometer reached 161, 277, and 384°F. instead of 167, 284, and 392°F., respectively. The same statement may be made in another way: In accordance with the new Federal specification for United States Government Motor Gasoline, the percentages evaporated for the El Paso samples should

9 U. S. Bureau of Mines, United States Government Specification for Lubricants and Liquid Fuels and Methods for Sampling and Testing: Tech. Paper 323B, 1927, 121 pp. Obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., price 15 cents.

10 Rue, H. P. and Espach, Ralph, Refining of Light Petroleum Distillates. Bull. 333, Bureau of Mines, 1930, 111 pp.

11 American Society for Testing Materials: Report of Committee D-2 and Methods of Test Relating to Petroleum Products, 1931.

12 Barringer, E. L., Pros and Cons for the "Third" Grade: Nat. Petrol. News, Nov. 4, 1931, vol. 23, No. 44, p. 38.

have been determined at Bartlesville at 173, 291, and 400°F., instead of 167, 284, and 392°F., respectively, because of the effect of a barometric pressure of 739 millimeters of mercury on samples of gasoline that were to be used at a mean barometric pressure of 865 millimeters of mercury. It is probable that if the higher temperatures, mentioned above, had been used in determining the distillation data for the El Paso samples, all of them would have passed the distillation requirements of the new Federal specification for United States Government Motor Gasoline.

Sulphur Content

The apparatus and procedure for making the sulphur determination are described in Method D 90-30T of the American Society for Testing Materials.¹³

The results of determinations for sulphur content on the individual samples are given in Table 3. These results are summarized in Table 4, which classifies all samples according to the results of the sulphur determination; Table 5, showing these data for the competitive-price gasolines; and Table 6, which classifies premium-price motor fuels according to results of the sulphur determination. The data of Tables 4, 5, and 6, compared with similar data for previous surveys, are summarized in Table 1.

Table 1.- Sulphur content of motor fuel samples

Survey	Date	0.06 per cent or less			0.08 per cent or less			0.10 per cent or less		
		All, ¹ per cent	Comp. ² per cent	Prem. ³ per cent	All, ¹ per cent	Comp. ² per cent	Prem. ³ per cent	All, ¹ per cent	Comp. ² per cent	Prem. ³ per cent
22nd	Aug., 1930	54.4	53.6	54.8	73.8	74.2	73.1	85.6	84.5	87.5
23rd	Mar., 1931	53.1	54.0	51.3	66.6	67.5	64.6	85.8	83.9	89.3
24th	Aug., 1931	59.9	61.1	57.1	74.9	75.1	74.4	87.6	86.4	90.8

1 All samples

2 Competitive-price gasolines

3 Premium-price motor fuels

The data in this table show that the samples obtained in this survey had a smaller average sulphur content than either of the two preceding surveys. This is contrary to what might be expected, as normally sulphur content is somewhat higher during the summer months, due to refining practice and also to the fact that a somewhat smaller proportion of natural gasoline, which has a low sulphur content, is used in commercial motor fuels during the summer months because a lower Reid vapor pressure is re-

¹³ See footnote 11.

quired at that time. The authors tentatively suggest the hypothesis that the lower sulphur content of motor fuels is due in part at least to the great quantity of low-sulphur gasoline that has been produced from East Texas crude oil during the past year and to a reduction in the production of crude oil containing larger proportions of sulphur, notably West Texas crude oil.

As shown by Table 1, 87.6 per cent of all samples, 86.4 per cent of the competitive-price motor fuels, and 90.8 per cent of the premium-price motor fuels, had 0.10 per cent of sulphur or less and therefore came within the limit of the Federal specification. This is a larger percentage of passing samples than was indicated by either of the two preceding surveys.

Reid Vapor Pressure

The apparatus and procedure for making the Reid vapor pressure determination are described in Method D 323-31T of the American Society for Testing Materials.¹⁴

The results of determinations of Reid vapor pressure on the individual samples are given in Table 3. These results are summarized in Table 7, which gives the classification of all samples according to the results of the Reid vapor pressure test; Table 8, which gives these data for the competitive-price gasolines; and Table 9, which shows the classification of the premium-price motor fuels according to the results of the Reid vapor pressure determination. The data of Tables 7, 8, and 9, compared with similar data for previous surveys, are summarized in Table 2.

Table 2.- Vapor pressure of motor fuel samples

Survey	Date	8 pounds or less			8.1 to 10 pounds			Over 10 pounds		
		All, ¹ per cent	Comp., ² per cent	Prem., ³ per cent	All, ¹ per cent	Comp., ² per cent	Prem., ³ per cent	All, ¹ per cent	Comp., ² per cent	Prem., ³ per cent
22nd	Aug., 1930	80.9	78.9	84.6	19.1	21.1	15.4	-	-	-
23rd	Mar., 1931	28.5	22.2	40.0	51.6	55.1	45.7	19.9	23.7	14.3
24th	Aug., 1931	68.0	64.2	76.5	51.7	35.3	23.5	0.3	0.5	-

1 All samples

2 Competitive price gasolines

3 Premium price motor fuels

Table 7 shows that 102 samples, or 32.0 per cent of all samples, failed to pass the optional maximum requirement of the new Federal specification for United States Government Motor Gasoline, which limits the

¹⁴ See footnote 11.

Reid vapor pressure to 8 pounds per square inch.¹⁵ Tables 8 and 9 show that 79 of these samples, or 35.7 per cent, were competitive-price motor fuels, and 23 samples, or 23.5 per cent, were premium-price motor fuels. The effect of vapor pressure on automobile performance is discussed by Bridgeman, White, and Gary.¹⁶ Table 2 shows how vapor pressures of samples obtained in this survey compare with those obtained in two previous surveys.

Summary Statement

A total of 319 samples were collected in 19 areas throughout the United States during August, 1931, for the twenty-fourth gasoline survey of the Bureau of Mines. Two hundred and twenty-one of these samples were competitive-price gasolines, and 98 samples were premium-price motor fuels. This report presents the results of the examination of these samples in accordance with the new Federal specification for United States Government Motor Gasoline, which will become mandatory for all departments and independent establishments of the Government after March 1, 1932. This analysis indicates that only two of the samples failed to pass the corrosion test; five samples, or 2.3 per cent of the competitive-price gasolines, failed to pass the distillation test; 14.6 per cent of the competitive-price gasolines failed to pass the sulphur requirement; and 35.7 per cent of the competitive-price gasolines had Reid vapor pressures higher than 8.0 pounds per square inch and therefore did not come within the optional maximum requirement of the Federal specification, although all of the samples came within the specification requirement of 12 pounds.

Taking account of those samples that failed in more than one requirement, and including the optional maximum requirement of 8 pounds vapor pressure, 105 of the competitive-price gasolines, or 47.5 per cent, failed to pass the requirements of the new Federal specification.

This survey indicates a reversal of the tendency toward higher sulphur content that was noted in previous surveys. As has been pointed out, this may be a temporary condition due to the increased production of crude oil from East Texas, which has a low sulphur content, and contains a relatively large proportion of gasoline. The increase in average vapor pressure over that observed for samples collected in August, 1930, is especially noticeable.

15 The vapor pressure requirement of the new specification is as follows:
Vapor Pressure - Method C. The vapor pressure at 37.8°C. (100°F.) shall not exceed 12 pounds per square inch.

C. The method and procedure to be used in making the vapor pressure test are described in Method D 323-30T of the American Society for Testing Materials.

The Government reserves the right to reject material (a) in those localities where the normal mean minimum temperature during the month of January is greater than 27°F. if the vapor pressure at 37.8°C. (100°F.) exceeds 10 pounds per square inch; (b) during the months of June, July, August and September if the vapor pressure at 37.8°C. (100°F.) exceeds 8 pounds per square inch.

16 Bridgeman, O.C., White, H.S., and Gary, F.B., Gasoline Vapor Pressures Permissible with 1931 Motor Cars: Paper presented at Twelfth Annual Meeting, American Petroleum Institute, Chicago, Ill., Nov. 11, 1931. Published in Oil and Gas Journal, Nov. 19, 1931, pp. 22, 101, under the title: Two Rules Govern Vapor Lock Problem.

Table 3. - Motor-gasoline survey, August, 1931
Data for samples from different cities

BOSTON

Competitive-price gasoline

Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
1	No	14.8	73.8	(2)	1.2	0.02	7.9
2	No	10.8	59.8	(2)	1.2	.10	6.7
3	No	18.0	70.0	(2)	1.0	.08	7.9
4	No	17.3	59.8	96.8	1.2	.08	9.0
5	No	13.0	63.0	97.5	1.0	.09	7.5
6	No	18.7	65.7	(2)	1.3	.06	8.6
7	No	21.6	67.6	(2)	1.2	.06	9.4
8	No	15.4	62.9	97.9	0.9	.07	7.9
9	No	22.0	66.0	98.5	1.5	.07	8.7
10	No	15.2	53.7	96.7	0.8	.08	8.5
11	No	19.0	68.5	(2)	0.8	.05	8.2
Av.		16.8			1.1	.07	8.2
Premium-price motor fuels							
12	No	15.0	68.0	(2)	0.8	.10	7.8
13	No	15.0	69.5	(2)	1.0	.10	8.1
14	No	14.0	77.0	(2)	1.0	.04	7.3
15	No	17.5	66.0	96.5	1.3	.06	8.7
16	No	14.5	68.0	(2)	1.0	.06	7.5
Av.		15.2			1.0	.07	7.9

NEW YORK

Competitive-price gasoline

17	No	19.2	63.7	97.7	0.8	0.08	7.9
18	No	16.2	65.2	97.3	1.3	.03	8.2
19	No	17.4	65.9	95.9	1.3	.05	8.8
20	No	22.2	70.7	(2)	1.3	.06	8.5
21	No	20.5	69.0	(2)	1.0	.09	8.3
22	No	21.2	66.2	98.2	0.8	.10	9.3
23	No	17.0	69.0	(2)	1.0	.05	8.6
24	No	13.6	66.1	97.1	1.3	.08	6.5
25	No	13.2	57.7	95.7	1.3	.08	6.4
26	No	15.1	59.6	(2)	0.9	.04	6.5
27	No	19.1	58.6	98.1	0.9	.06	9.0
Av.		17.7			1.1	.07	8.0
Premium-price motor fuels							
28	No	12.4	54.9	95.4	1.1	.09	3.5
29	No	15.0	68.0	98.0	1.0	.03	7.2
30	No	15.8	63.3	96.3	1.2	.06	8.0
31	No	21.6	75.6	(2)	1.2	.09	8.7
32	No	16.7	69.2	(2)	1.3	.05	7.9
Av.		16.3			1.2	.06	7.5

1 - Reid vapor pressure in pounds per square inch.

2 - End point under 392°F.

Table 3.- Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

WASHINGTON							
Competitive-price gasoline							
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
33	No	17.0	62.5	97.0	1.0	0.09 ³	8.6
34	No	14.5	54.0	96.5	1.2	.11 ³	7.5
35	No	15.4	53.9	97.4	0.8	.11 ³	7.2
36	No	16.0	60.5	98.0	1.0	.08	7.7
37	No	17.5	62.0	98.0	1.0	.09	7.6
38	No	13.9	59.9	97.9	1.1	.09	6.6
39	No	17.8	59.8	(2)	1.0	.06 ³	8.2
40	No	17.0	67.0	(2)	0.9	.13 ³	7.2
41	No	16.0	65.0	(2)	1.0	.08	7.8
42	No	18.4	59.4	96.9	0.8	.07	7.9
Av.		16.4			0.9	.09	7.6
Premium-price motor fuels							
43	No	18.4	65.4	(2)	0.8	.08	8.8
44	No	14.6	72.6	98.8	1.2	.18 ³	6.5
45	No	29.8	78.8	98.3	1.0	.09	8.8
46	No	16.3	64.8	96.8	1.4	.08	6.9
47	No	15.2	60.7	97.7	1.0	.08	6.6
48	No	15.9	70.9	(2)	1.1	.10	6.8
49	No	18.0	80.5	(2)	1.0	.03	7.8
50	No	16.0	60.0	95.5	1.0	.10	7.6
51	No	25.0	80.0	(2)	0.8	.09	8.0
52	No	20.1	60.6	97.1	1.4	.06	8.3
Av.		18.9			1.1	.09	7.6
PITTSBURGH							
Competitive-price gasoline							
53	No	20.1	67.1	99.1	0.9	.09	9.3
54	No	15.0	58.5	95.0	0.8	.08	6.7
55	No	20.3	66.3	(2)	1.1	.03	8.8
56	No	16.5	59.0	97.5	1.0	.08	8.4
57	No	15.6	54.6	93.1	1.2	.06	8.9
58	No	16.2	59.2	97.2	1.0	.08	7.3
59	No	18.1	56.6	96.6	1.2	.06	8.0
60	No	13.1	55.1	95.6	1.9	.05	6.8
61	No	18.5	65.0	97.5	1.3	.10	8.8
62	No	15.6	59.6	97.6	1.2	.08	8.2
63	No	17.5	65.5	98.7	1.3	.10	8.5
Av.		17.0			1.2	.07	8.2
Premium-price motor fuels							
64	No	20.5	70.0	(2)	1.3	.09	8.7
65	No	17.1	64.1	96.6	0.9	.09	7.9
66	No	15.9	58.4	93.9	1.3	.05	7.1
67	No	21.7	64.2	96.7	0.8	.05	8.3
68	No	13.0	64.0	98.0	1.0	.09	6.2
Av.		17.6			1.1	.07	7.6

1 - Reid vapor pressure in pounds per square inch. 2 - End point under

3 - Failed

392°F.

Table 3.- Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

CLEVELAND		Competitive-price gasoline					
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V. P. ¹
		Per cent evaporated at:					
		167°F.	254°F.	392°F.	Residue		
69	No	17.0	56.0	93.5	1.0	0.06	8.5
70	No	16.6	60.6	97.6	1.2	.02	7.8
71	No	15.8	63.3	97.8	1.2	.04	8.7
72	No	13.1	51.6	93.6	1.2	.03	7.5
73	No	12.2	65.7	95.7	1.3	.04	6.5
74	No	22.1	66.1	96.1	1.2	.08	9.2
75	No	16.8	64.3	97.8	0.7	.08	8.4
76	No	17.7	54.7	93.7	1.3	.03	8.8
77	No	18.0	67.0	96.0	1.2	.08	7.8
78	No	11.9	73.9	(2)	1.1	.03	5.8
79	No	15.2	61.2	97.2	0.8	.12 ³	6.9
80	No	15.0	58.5	97.0	1.2	.09	7.2
Av.		16.0			1.1	.06	7.8
Premium-price motor fuels							
81	No	15.7	69.2	97.2	0.8	.04	6.5
82	No	15.8	71.8	97.3	1.2	.06	6.9
83	No	16.7	68.2	97.2	0.8	.07	7.0
84	No	18.2	69.2	98.2	0.8	.12 ³	7.2
Av.		16.6			0.9	.07	6.9

ATLANTA		Competitive-price gasoline					
85	No	17.2	60.7	91.7	1.3	0.01	8.2
86	No	22.5	66.0	98.5	0.8	.08	8.2
87	No	17.3	57.3	91.8	1.1	.07	8.0
88	No	13.7	56.2	94.7	1.2	.05	6.9
89	No	15.9	65.4	95.9	1.3	.02	6.6
90	No	16.8	60.8	95.8	1.2	.06	7.3
91	No	16.0	58.5	94.0	1.0	.06	7.5
92	No	17.1	59.6	95.6	1.3	.05	7.6
93	No	13.6	68.6	97.1	1.4	.09	8.0
94	No	17.3	66.8	95.8	1.4	.05	7.1
95	No	17.2	63.2	94.2	1.3	.06	7.7
96	No	14.9	56.9	97.9	1.3	.06	7.5
97	No	16.0	59.5	97.0	1.1	.09	7.5
Av.		16.6			1.2	.06	7.5
Premium-price motor fuels							
98	No	14.0	60.6	94.5	1.3	.02	7.8
99	No	18.7	65.7	97.7	1.0	.09	7.2
100	No	15.6	68.6	(2)	1.2	.06	6.5
Av.		15.4			1.2	.06	7.2

1 - Reid vapor pressure in pounds per square inch.

2 - End point under

3 - Failed.

392°F.

Table 3. - Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

CHICAGO		Competitive-price gasoline					
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
101	No	16.2	61.7	94.7	0.8	0.03	8.3
102	No	34.4	71.4	95.4	1.0	.09	9.7
103	No	15.7	61.7	98.2	0.8	.15 ³	8.2
104	No	17.4	59.4	(2)	1.2	.03	8.4
105	No	10.2	48.7 ³	89.2 ³	1.3	.09	7.1
106	No	18.0	63.5	(2)	0.9	.17 ³	6.7
107	No	16.2	60.2	96.7	0.8	.04	8.1
108	No	15.5	56.0	91.5	0.8	.04	8.1
109	No	15.7	55.2	95.2	0.8	.04	8.6
110	No	19.6	62.1	93.6	1.2	.18 ³	8.4
111	No	16.1	62.6	94.6	1.3	.10	8.4
112	No	15.5	61.3	95.0	1.3	.02	8.3
113	No	18.6	61.6	94.6	1.2	.03	9.2
114	No	13.4	55.9	95.4	0.8	.22 ³	7.1
115	No	14.4	56.9	93.9	1.3	.03	7.2
116	No	13.5	70.5	(2)	1.8	.03	7.6
Av.		16.9			1.1	.08	8.1
Premium-price motor fuels							
117	No	13.9	61.9	96.9	1.3	.06	8.4
118	No	16.2	79.7	(2)	0.8	.04	7.5
119	No	18.0	72.0	99.2	0.8	.06	8.3
120	No	10.6	57.6	97.6	1.2	.16 ⁵	5.0
Av.		14.7			1.0	.08	7.8

NEW ORLEANS

Competitive-price gasoline

121	No	15.2	64.2	95.7	0.8	0.01	7.4
122	No	14.8	63.8	95.8	1.0	.04	7.5
123	No	19.0	65.3	97.0	1.0	.07	8.3
124	No	14.4	57.4	96.4	1.1	.08	7.5
125	No	16.2	66.2	97.2	0.8	.03	8.9
126	No	19.3	65.5	(2)	1.3	.06	8.4
127	No	12.0	52.0	93.5	1.0	.06 ³	5.7
128	No	19.7	64.7	97.2	1.1	.20 ³	8.9
129	No	16.9	57.9	97.4	1.1	.08	8.0
130	No	16.4	65.4	95.9	0.8	.01	7.2
131	No	14.0	61.0	97.5	0.8	.17 ³	6.7
132	No	17.3	64.8	95.3	0.9	.02	8.0
Av.		16.3			1.0	.07	7.7
Premium-price motor fuels							
133	No	15.0	59.0	99.0	1.0	.08	7.2
134	No	11.9	56.4	98.9	1.1	.09	6.1
135	No	18.8	76.8	(2)	1.2	.05	6.6
136	No	15.9	75.9	(2)	1.1	.02	6.3
Av.		15.4			1.1	.06	6.6

1 - Reid vapor pressure in pounds per square inch. 2 - End point under 392°F.
3 - Failed

Table 3. - Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

ST. LOUIS

Competitive-price gasoline

Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
137	No	11.4	54.4	95.4	0.8	0.06	6.2
138	No	9.1 ²	51.6	92.1	1.4	.06	5.6
139	No	15.2	57.2	95.2	1.0	.14 ²	7.6
140	No	12.7	53.2	92.7	1.3	.02	6.9
141	No	15.7	57.2	91.2	0.8	.04	7.2
142	No	20.4	61.9	96.9	0.8	.05	9.1
143	No	16.0	63.5	98.0	0.8	.04	7.9
144	No	16.0	59.0	94.5	1.0	.22 ²	8.1
145	No	13.9	55.4	95.4	0.6	.04	7.2
146	No	13.8	52.8	88.3 ²	1.4	.09	5.6
147	No	12.6	58.6	94.6	1.2	.04	7.2
148	No	14.4	57.9	97.4	1.1	.03	7.0
149	No	20.0	62.0	93.0	1.0	.03	8.9
150	No	28.8	68.8	94.8	1.2	.08	9.1
Av.		15.7			1.0	.07	7.4

Premium-price motor fuels

151	No	11.0	70.5	99.2	0.8	.06	5.8
152	No	16.0	66.0	(3)	1.0	.03	8.0
153	No	14.9	64.9	98.7	1.3	.03	6.5
154	No	14.6	76.6	(3)	1.4	.03	7.2
155	No	21.7	63.7	93.2	1.2	.03	9.3
156	No	28.0	65.5	94.0	0.9	.08	7.7
Av.		17.7			1.1	.04	7.4

MINNEAPOLIS-ST. PAUL

Competitive-price gasoline

157	No	14.5	58.5	95.0	1.0	0.03	6.8
158	No	22.0	61.5	97.0	1.0	.05	9.2
159	No	16.2	57.7	94.2	0.8	.03	7.4
160	No	15.9	54.9	95.9	1.3	.06	7.8
161	No	15.1	67.1	97.1	0.9	.05	7.1
162	No	15.0	56.0	93.0	1.0	.04	6.6
163	No	19.0	62.5	97.0	1.0	.03	9.0
164	No	14.0	58.0	95.5	1.0	.02	6.7
165	No	19.4	53.9	94.4	0.8	.09	8.8
166	No	35.7	74.2	95.7	1.3	.06	9.2
167	No	17.0	59.0	96.0	1.0	.03	7.8
Av.		18.5			1.0	.04	7.9

Premium-price motor fuels

168	No	15.8	65.8	97.8	1.0	.03	7.4
169	No	18.0	63.0	98.0	0.8	.06	7.7
170	No	20.0	66.0	99.0	1.0	.05	8.2
171	No	49.3	87.8	97.8	1.2	.05	9.4
172	No	15.9	65.9	95.9	0.9	.02	6.6
Av.		23.8			1.0	.04	7.9

1 - Reid vapor pressure in pounds per square inch. 3 - End point under 392°F.

2 - Failed

Table 3.- Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

OMAHA		Competitive-price gasoline					
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
173	No	15.0	57.0	98.0	0.8	0.03	7.8
174	No	14.7	65.7	(2)	1.1	.06	6.4
175	Yes ³	16.6	62.1	94.1	1.2	.03	7.6
176	No	12.0	60.0	97.0	1.2	.02	6.4
177	No	16.3	63.8	97.8	1.2	.06	8.2
178	No	17.1	65.1	(2)	1.3	.02	8.3
179	No	13.7	59.2	99.0	1.0	.26 ³	6.4
180	No	14.6	60.1	94.6	0.8	.02	6.9
181	No	15.5	57.0	96.0	1.0	.05	7.3
182	No	16.7	59.7	95.2	1.0	.02	6.7
183	No	25.2	68.2	95.2	1.2	.04	8.4
Av.		16.2			1.1	.06	7.3
Premium-price motor fuels							
184	No	19.3	57.8	93.3	1.0	.02	8.6
185	No	20.8	85.3	(2)	1.0	.02	7.9
186	No	12.5	57.0	97.5	1.0	.24 ³	6.4
187	No	15.8	77.3	(2)	1.2	.02	6.7
188	No	27.5	65.0	93.5	1.0	.03	8.3
Av.		19.2			1.3	.07	7.6
TULSA		Competitive-price gasoline					
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
189	No	16.8	61.3	97.8	1.0	0.03	8.0
190	No	22.3	69.3	93.8	1.2	.02	7.5
191	No	15.2	55.7	94.7	0.8	.03	6.9
192	No	19.0	48.5 ³	89.5 ³	1.0	.03	7.8
193	No	20.1	60.1	94.6	1.2	.03	7.9
194	No	14.0	60.5	94.5	1.0	.02	6.5
195	No	14.9	59.9	95.4	1.1	.02	7.2
196	No	12.7	55.7	90.7	1.3	.01	6.9
197	No	22.3	73.3	96.8	1.2	.02	8.6
198	No	15.3	68.8	(2)	1.2	.03	6.8
199	No	14.4	59.4	92.9	1.1	.01	6.5
Av.		17.0			1.1	.02	7.3
Premium-price motor fuels							
200	No	15.2	62.2	97.2	1.0	.03	7.5
201	No	27.8	61.8	94.3	1.2	.02	6.7
202	No	21.5	75.0	98.7	1.3	.03	8.7
203	No	18.9	64.9	97.9	1.1	.03	7.8
204	No	19.4	65.9	97.4	0.9	.03	8.1
Av.		20.6			1.1	.03	7.8

1 - Reid vapor pressure in pounds per square inch. 2- End point under
3 - Failed. 392°F.

Table 3 - Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

DALLAS		Competitive-price gasoline					
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
205	No	12.8	64.3	95.3	1.2	Trace	6.5
206	No	18.3	56.3	92.3	1.2	0.04	9.0
207	No	12.2	64.2	94.7	1.0	.03	6.4
208	No	15.1	66.6	97.6	0.9	.13 ²	8.0
209	No	18.0	66.0	97.5	1.0	.04	8.5
210	No	14.9	62.4	97.4	1.1	.07	7.6
211	No	17.1	68.6	97.6	0.9	.01	7.4
212	No	15.1	57.6	94.1	0.8	.09	8.4
213	No	15.3	54.3	91.8	1.1	.04	8.0
214	No	13.5	58.5	91.5	1.3	.03	6.6
215	No	13.1	60.1	92.1	1.1	.02	6.9
216	No	15.8	64.3	95.3	1.2	.02	7.0
217	No	17.6	70.1	98.9	1.1	.01	8.2
Av.		15.3			1.1	.04	7.6
Premium-price motor fuels							
218	No	14.7	61.7	97.1	0.8	.09	7.4
219	No	13.7	69.2	96.2	0.8	.03	6.9
220	No	11.8	59.8	92.8	1.2	.01	5.7
221	No	16.2	64.7	97.7	0.8	.08	7.1
222	No	17.3	69.8	97.3	1.2	.16 ²	6.8
223	No	17.7	75.7	(3)	0.8	.05	7.1
Av.		15.2			0.9	.07	6.8
EL PASO		Competitive-price gasoline					
224	No	8.8 ⁴	49.8 ⁴	88.8 ⁴	1.1	0.14 ²	5.8
225	No	10.7	54.2	96.2	1.2	.10 ⁴	6.8
226	No	9.5 ⁴	52.0	92.0	0.8	.15 ²	5.2
227	No	12.2	55.7	90.7	0.8	.12 ²	6.0
228	No	14.0	66.0	98.0	1.0	.12 ²	6.4
229	No	10.3	54.8	90.8	1.2	.13 ²	6.0
Av.		10.9			1.0	.13 ²	6.0
Premium-price motor fuels							
230	No	7.5 ⁴	65.8	(3)	0.7	.09	4.4
231	No	10.3	56.8	97.8	1.2	.11 ²	4.7
232	No	8.2 ⁴	66.2	(3)	1.1	.09	4.0
233	No	11.5	69.0	(3)	0.8	.06	5.9
234	No	12.2	71.2	(3)	0.8	.07	6.2
235	No	20.2	78.2	(3)	0.8	.05	7.7
Av.		11.7			0.9	.08	8.0

1 - Reid vapor pressure, in pounds per square inch.

2 - Failed.

3 - End point under 392 F.

4 - See page 5.

Table 3. - Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

DENVER¹

Competitive-price gasoline							
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.F. ²
		Per cent evaporated at:					
		167°F.	296°F.	405°F.	Residue		
236	No	17.1	63.1	95.1	1.1	0.04	7.3
237	No	14.7	55.7	95.2	0.8	.02	6.5
238	No	17.3	63.8	95.3	1.2	.03	6.6
239	No	16.5	61.0	93.0	1.5	.06	6.6
240	No	17.0	60.5	95.5	1.0	.02	7.0
241	No	16.9	70.4	(3)	1.1	.03	6.3
242	No	15.7	63.2	95.7	1.0	.02	7.0
243	No	12.9	58.9	97.4	1.0	.02	6.5
244	No	17.3	60.5	97.5	1.2	.03	7.3
Av.		16.2			1.2	.03	6.8
Premium-price motor fuels							
245	No	28.7	68.7	96.7	1.3	.02	8.1
246	No	15.3	66.3	96.8	1.2	.07	5.1
247	No	23.5	73.0	(3)	0.8	.03	8.6
Av.		22.5			1.1	.04	7.3

SALT LAKE CITY ¹		Competitive-price gasoline					
248	No	18.8	66.8	(3)	1.0	0.02	7.3
249	No	16.9	58.9	97.4	0.8	.02	6.4
250	No	18.4	60.4	96.4	1.1	.02	7.3
251	No	20.4	60.4	96.9	1.1	.02	7.8
252	No	20.0	64.5	96.0	1.0	.04	7.1
253	No	18.0	61.0	96.5	1.0	.03	7.5
254	No	20.5	70.0	95.0	0.9	.01	7.3
255	No	20.4	63.9	97.4	0.9	.03	7.5
256	No	16.5	65.0	(3)	1.3	.15 ⁴	6.7
257	No	27.0	71.0	96.5	1.0	.07	8.1
Av.		19.7			1.0	.04	7.3
Premium-price motor fuels							
258	No	18.5	63.0	97.0	1.0	.03	6.9
259	No	23.8	82.8	(3)	1.2	.05	7.1
Av.		21.2			1.1	.04	7.0

1 - Distillation data corrected for difference in altitude between this city and Bartlesville, Okla.

2 - Reid vapor pressure in pounds per square inch

3 - End point under 392°F.

4 - Failed

Table 3.- Motor-gasoline survey, August, 1931 - Continued
Data for samples from different cities

SEATTLE							
Competitive-price gasoline							
Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
260	No	20.4	69.4	96.4	1.1	0.05	9.1
261	No	16.5	59.5	94.5	1.0	.06	8.6
262	No	14.6	55.6	92.1	1.2	.21 ²	7.5
263	No	20.5	64.0	97.5	0.8	.30 ²	8.6
264	No	19.0	64.0	97.0	1.0	.09	8.9
265	No	17.0	61.5	94.5	0.9	.04	7.4
266	No	17.2	65.2	96.2	1.3	.03	7.7
267	No	15.1	59.1	95.1	0.9	.04	7.4
268	No	16.4	61.9	95.4	1.1	.05	8.6
Av.		17.4			1.0	.10	8.2
Premium-price motor fuels							
269	No	17.4	64.4	95.9	1.1	.03	8.1
270	No	15.1	75.1	(3)	0.9	.03	6.6
271	No	22.0	79.0	(3)	1.0	.03	7.4
272	No	20.0	66.0	97.6	1.0	.22 ²	7.0
273	No	19.5	67.5	(3)	1.0	.07	7.4
274	No	17.7	73.2	(3)	0.8	.04	8.4
275	No	12.0	61.5	98.0	1.0	.08	6.5
Av.		17.7			1.0	.08	7.3
LOS ANGELES							
Competitive-price gasoline							
276	No	2.0 ²	54.5	91.5	1.2	0.14 ²	5.8
277	No	10.1	56.1	91.1	0.9	.16 ²	6.3
278	Yes ²	18.0	59.0	94.5	1.5	.07	9.0
279	No	12.2	62.7	94.7	1.3	.06	6.7
280	No	20.0	61.0	96.5	1.3	.40 ²	8.5
281	No	17.2	60.2	95.2	1.3	.06	8.5
282	No	18.0	62.0	97.5	1.0	.09	8.0
283	No	14.5	59.8	92.5	1.2	.08	7.6
284	No	12.7	59.2	94.2	1.2	.03	6.8
285	No	13.2	65.2	98.7	1.3	.01	7.2
286	No	12.6	55.1	92.1	0.9	.09	7.0
287	No	15.1	66.1	95.1	0.9	.05	6.8
288	No	13.4	58.4	92.4	0.8	.03	6.8
289	No	18.6	60.6	95.6	1.2	.34 ²	8.2
290	No	12.0	60.5	94.5	0.9	.03	7.0
291	No	14.4	65.9	94.4	0.8	.03	6.5
292	No	16.5	58.5	92.5	1.2	.23 ²	6.8
293	No	17.1	59.1	93.1	0.9	.07	8.6
Av.		14.7			1.1	.11 ²	7.3
Premium-price motor fuels							
294	No	13.5	71.0	94.0	1.0	.03	6.7
295	No	17.0	60.0	98.0	0.9	.30 ²	7.3
296	No	17.3	67.3	97.3	1.2	.03	7.5
297	No	17.4	65.9	98.9	1.1	.03	8.6
298	No	13.0	78.0	(3)	1.0	.03	7.0
299	No	19.6	77.1	(3)	1.2	.07	7.0
Av.		16.3			1.1	.09	7.4

1 - Reid vapor pressure in pounds per square inch. 2 - Failed.

3 - End point under 392°F.

Table 3. - Motor-gasoline survey, August, 1931 - Continued

Data for samples from different cities

SAN FRANCISCO

Competitive-price gasoline

Sample number	Corrosion test	Distillation range				Sulphur, per cent	V.P. ¹
		Per cent evaporated at:					
		167°F.	284°F.	392°F.	Residue		
300	No	18.7	61.2	95.7	1.3	0.09	9.2
301	No	19.9	61.4	97.4	0.9	.23 ²	10.2
302	No	16.6	64.6	94.6	1.2	.20 ²	8.0
303	No	16.5	62.5	95.0	1.2	.05	9.3
304	No	14.3	61.3	96.8	0.7	.12 ²	8.4
305	No	16.7	61.7	95.2	1.3	.10+	8.1
306	No	16.9	59.9	94.9	1.6	.05	8.6
307	No	15.5	63.0	94.5	1.0	.05	7.3
308	No	15.4	58.9	92.4	1.1	.07	7.9
309	No	27.2	70.7	93.7	1.3	.03	8.6
310	No	17.5	64.5	95.5	1.0	.04	7.3
311	No	12.2	59.2	93.2	1.3	.07	7.0
312	No	15.0	61.5	94.0	1.0	.05	8.5
Av.		17.1			1.1	.09	8.3

Premium-price motor fuels

313	No	20.3	63.8	97.3	1.2	.07	9.2
314	No	21.3	65.8	98.3	1.0	.17 ²	7.9
315	No	24.0	78.0	(3)	0.8	.04	7.5
316	No	17.0	69.5	99.0	1.0	.02	6.6
317	No	15.4	73.9	(3)	1.1	.04	7.1
318	No	16.0	53.0	94.5	1.0	.08	7.7
319	No	15.2	61.2	97.7	1.0	.08	7.1
Av.		18.2			1.0	.07	7.6

1 - Reid vapor pressure in pounds per square inch. 2 - Failed

3 - End point under 392°F.

Table 4.- Classification of samples according to results of sulphur determination

City	Sulphur, per cent																		
	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	Over 17	Total
Boston	-	1	-	1	1	4	2	3	1	3	-	-	-	-	-	-	-	-	16
New York	-	-	2	1	3	3	-	3	3	1	-	-	-	-	-	-	-	-	16
Washington	-	-	1	-	-	2	1	5	5	2	2	-	1	-	-	-	-	1	20
Pittsburgh	-	-	1	-	3	2	-	4	4	2	-	-	-	-	-	-	-	-	16
Cleveland	-	1	3	3	-	2	1	3	1	-	-	2	-	-	-	-	-	-	16
Atlanta	1	2	-	-	3	5	1	1	3	-	-	-	-	-	-	-	-	-	16
Chicago	-	1	5	4	-	2	-	-	2	1	-	-	-	-	1	1	1	2	20
New Orleans	2	2	1	1	1	2	1	3	1	-	-	-	-	-	-	-	-	1	16
St. Louis	-	1	6	4	1	3	-	2	1	-	-	-	-	1	-	-	-	1	20
Minneapolis-																			
St. Paul	-	2	5	1	4	3	-	-	1	-	-	-	-	-	-	-	-	-	16
Omaha	-	7	5	1	1	2	-	-	-	-	-	-	-	-	-	-	-	2	16
Tulsa	2	5	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Dallas	4	2	3	3	1	-	1	1	2	-	-	-	1	-	-	1	-	-	19
El Paso	-	-	-	-	1	1	1	-	2	1	1	2	1	1	1	-	-	-	12
Denver	-	5	4	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	12
Salt Lake City	1	4	3	1	1	-	1	-	-	-	-	-	-	-	1	-	-	-	12
Seattle	-	-	3	3	2	1	1	2	1	-	-	-	-	-	-	-	-	3	16
Los Angeles	1	-	3	-	3	4	3	2	2	-	-	-	-	1	-	1	-	4	24
San Francisco	-	1	1	3	4	-	3	2	1	1	-	1	-	-	-	-	1	2	20
Total	11	54	53	27	29	37	17	31	30	11	3	5	3	3	3	3	3	16	319
Percentage of total	3.4	10.7	16.6	8.5	9.1	11.6	5.3	9.7	9.4	3.4	0.9	1.6	0.9	0.9	0.9	0.9	0.9	5.0	100

Table 5.- Classification of samples according to results of sulphur determination

COMPETITIVE-PRICE GASOLINE

City	Sulphur, per cent																	Over 17	Total
	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15	.16	.17		
Boston	-	1	-	-	1	2	2	3	1	1	-	-	-	-	-	-	-	-	11
New York	-	-	1	1	2	2	1	3	1	3	2	-	1	-	-	-	-	-	11
Washington	-	-	-	-	-	1	-	2	-	1	2	-	-	-	-	-	-	-	10
Pittsburgh	-	-	1	-	1	2	-	4	3	2	-	-	1	-	-	-	-	-	11
Cleveland	-	1	3	2	1	1	-	1	1	-	-	1	-	-	-	-	-	-	12
Atlanta	1	1	-	-	3	4	1	-	2	-	-	-	-	-	-	-	-	-	13
Chicago	-	1	5	3	-	-	1	-	2	-	-	-	-	-	1	-	1	2	16
New Orleans	2	1	1	1	-	2	-	2	1	-	-	-	-	1	-	-	1	1	12
St. Louis	-	1	2	4	1	2	-	1	-	-	-	-	-	-	-	-	-	-	14
Minneapolis-St. Paul	-	1	4	1	2	2	-	-	1	-	-	-	-	-	-	-	-	-	11
Omaha	-	4	2	1	2	2	-	-	1	-	-	-	-	-	-	-	-	-	11
Tulsa	-	4	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Dallas	3	2	2	3	-	-	1	-	1	-	-	-	1	-	1	-	-	-	13
El Paso	-	-	-	-	-	-	-	-	-	1	-	2	1	1	1	-	-	-	9
Denver	-	4	3	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	9
Salt Lake City	1	4	2	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	10
Seattle	-	-	1	2	2	1	-	-	1	-	-	-	-	-	-	-	-	-	9
Los Angeles	1	-	1	-	2	4	-	1	2	1	-	1	-	1	-	1	-	-	18
San Francisco	-	-	1	1	4	-	2	-	1	1	-	1	-	-	-	-	-	-	13
Total	10	25	34	21	19	26	11	20	16	7	2	4	3	5	5	1	2	12	221
Percentage of total	4.5	11.3	15.4	9.5	8.6	11.8	5.0	9.0	8.1	3.2	0.9	1.8	1.4	1.4	1.4	0.5	0.9	5.4	100

Table 6.- Classification of samples according to results of sulphur determination

PREMIUM-PRICE MOTOR FUELS

City	Sulphur, per cent															Over 20	Total
	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.11	.12	.16	.17	.18		
Boston	-	-	-	1	-	2	-	-	-	2	-	-	-	-	-	-	5
New York	-	-	1	-	1	1	-	-	2	-	-	-	-	-	-	-	5
Washington	-	-	1	-	-	1	-	3	2	2	-	-	-	-	1	-	10
Pittsburgh	-	-	-	-	2	-	-	-	3	-	-	-	-	-	-	-	5
Cleveland	-	-	-	1	-	1	1	-	-	-	-	1	-	-	-	-	4
Atlanta	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	3
Chicago	-	-	-	1	-	2	-	-	-	-	-	-	1	-	-	-	4
New Orleans	-	1	-	-	1	-	-	1	1	-	-	-	-	-	-	-	4
St. Louis	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	6
Minneapolis-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
St. Paul	-	1	1	-	2	1	-	-	-	-	-	-	-	-	-	-	5
Omaha	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	1	5
Tulsa	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Dallas	1	-	1	-	1	-	-	1	1	-	-	-	1	-	-	-	5
El Paso	-	-	-	-	1	1	1	-	2	-	1	-	-	-	-	-	6
Denver	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	6
Salt Lake City	-	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	3
Seattle	-	-	2	1	-	-	1	2	-	-	-	-	-	-	-	1	2
Los Angeles	-	-	2	-	1	-	1	1	-	-	-	-	-	-	-	1	7
San Francisco	-	1	-	2	-	-	1	2	-	-	-	-	-	1	-	-	6
Total	1	9	19	6	10	11	6	11	12	4	1	1	2	1	1	3	98
Percentage of total	1.0	9.2	19.4	6.1	10.2	11.2	6.1	11.2	12.3	4.1	1.0	1.0	2.0	1.0	1.0	3.1	100

Table 7. - Classification of samples according to results of theReid vapor-pressure determination

ALL SAMPLES

City	Reid vapor pressure, pounds per square inch												Total
	10.5	10.0	9.5	9.0	8.5	8.0	7.5	7.0	6.5	6.0	5.5	Less	
	to 10.1	to 9.6	to 9.1	to 8.6	to 8.1	to 7.6	to 7.1	to 6.6	to 6.1	to 5.6	to 5.1	than 5.1	
Boston	-	-	1	4	3	4	3	1	-	-	-	-	16
New York	-	-	1	4	3	3	1	-	3	-	1	-	16
Washington	-	-	-	3	2	7	3	4	1	-	-	-	20
Pittsburgh	-	-	1	4	4	2	2	2	1	-	-	-	16
Cleveland	-	-	1	2	2	2	3	3	2	1	-	-	16
Atlanta	-	-	-	-	2	5	6	2	1	-	-	-	16
Chicago	-	1	1	2	9	1	4	1	-	-	-	1	20
New Orleans	-	-	-	2	2	2	5	2	2	1	-	-	16
St. Louis	-	-	3	1	1	4	4	2	2	3	-	-	20
Minneapolis- St. Paul	-	-	3	2	1	3	3	4	-	-	-	-	16
Omaha	-	-	-	1	4	3	1	3	4	-	-	-	16
Tulsa	-	-	-	2	1	4	3	4	2	-	-	-	16
Dallas	-	-	-	1	3	3	4	5	2	1	-	-	19
El Paso	-	-	-	-	-	1	-	1	2	4	1	3	12
Denver	-	-	-	1	1	-	2	4	3	-	1	-	12
Salt Lake City	-	-	-	-	1	1	7	2	1	-	-	-	12
Seattle	-	-	1	4	2	1	5	2	1	-	-	-	16
Los Angeles	-	-	-	3	3	2	3	10	2	1	-	-	24
San Francisco	1	-	3	2	3	4	5	2	-	-	-	-	20
Total	1	1	15	38	47	52	64	54	29	11	3	4	319
Per cent of total	0.3	0.3	4.7	11.9	14.7	16.3	20.0	16.9	9.1	3.5	1.0	1.3	100

Table 8.- Classification of samples according to results
of the Reid vapor-pressure determination

COMPETITIVE-PRICE GASOLINE

City	Reid vapor pressure, pounds per square inch											Total
	10.5	10.0	9.5	9.0	8.5	8.0	7.5	7.0	6.5	6.0	5.5	
	to 10.1	to 9.6	to 9.1	to 8.6	to 8.1	to 7.6	to 7.1	to 6.6	to 6.1	to 5.6	to 5.1	
Boston	-	-	1	3	2	3	1	1	-	-	-	11
New York	-	-	11	3	3	1	-	-	3	-	-	11
Washington	-	-	-	1	1	4	3	1	-	-	-	10
Pittsburgh	-	-	1	3	3	1	1	2	-	-	-	11
Cleveland	-	-	1	2	2	2	2	1	1	1	-	12
Atlanta	-	-	-	-	2	4	5	2	-	-	-	13
Chicago	-	1	1	2	7	1	3	1	-	-	-	16
New Orleans	-	-	-	2	2	2	4	1	-	1	-	12
St. Louis	-	-	2	1	1	2	3	2	1	2	-	14
Minneapolis- St. Paul	-	-	2	2	-	2	2	3	-	-	-	11
Omaha	-	-	-	-	3	2	1	2	3	-	-	11
Tulsa	-	-	-	1	-	3	2	3	2	-	-	11
Dallas	-	-	-	1	3	3	1	3	2	-	-	13
El Paso	-	-	-	-	-	-	-	1	1	3	1	6
Denver	-	-	-	-	-	-	2	4	3	-	-	9
Salt Lake City	-	-	-	-	1	1	6	1	1	-	-	10
Seattle	-	-	1	4	-	1	3	-	-	-	-	9
Los Angeles	-	-	-	2	3	2	1	7	2	1	-	18
San Francisco	1	-	2	2	3	2	2	1	-	-	-	13
Total	1	1	12	29	36	36	42	36	19	8	1	221
Percentage of total	0.5	0.5	5.4	13.1	16.3	16.3	19.0	16.3	8.6	3.6	0.5	100

Table 9.- Classification of samples according to results of
the Reid vapor-pressure determination

PREMIUM-PRICE MOTOR FUELS

City	Reid vapor pressure, pounds per square inch											Total
	9.5	9.0	8.5	8.0	7.5	7.0	6.5	6.0	5.5	5.0	Less	
	to 9.1	to 8.6	to 8.1	to 7.6	to 7.1	to 6.6	to 6.1	to 5.6	to 5.1	to 4.6	than 4.6	
Boston	-	1	1	1	2	-	-	-	-	-	-	5
New York	-	1	-	2	1	-	-	-	1	-	-	5
Washington	-	2	1	3	-	3	1	-	-	-	-	10
Pittsburgh	-	1	1	1	1	-	1	-	-	-	-	5
Cleveland	-	-	-	-	1	2	1	-	-	-	-	4
Atlanta	-	-	-	1	1	-	1	-	-	-	-	3
Chicago	-	-	2	-	1	-	-	-	-	1	-	4
New Orleans	-	-	-	-	1	1	2	-	-	-	-	4
St. Louis	1	-	-	2	1	-	1	1	-	-	-	6
Minneapolis- St. Paul	1	-	1	1	1	1	-	-	-	-	-	5
Omaha	-	1	1	1	-	1	1	-	-	-	-	5
Tulsa	-	1	1	1	1	1	-	-	-	-	-	5
Dallas	-	-	-	-	3	2	-	1	-	-	-	6
El Paso	-	-	-	1	-	-	1	1	-	1	2	6
Denver	-	1	1	-	-	-	-	-	1	-	-	3
Salt Lake City	-	-	-	-	1	1	-	-	-	-	-	2
Seattle	-	-	2	-	2	2	1	-	-	-	-	7
Los Angeles	-	1	-	-	2	3	-	-	-	-	-	6
San Francisco	1	-	-	2	3	1	-	-	-	-	-	7
Total	3	9	11	16	22	18	10	3	2	2	2	98
Percentage of total	3.1	9.2	11.2	16.3	22.4	18.4	10.2	3.1	2.0	2.0	2.0	100